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# A new genus and a new species of scorpion (Scorpiones: Buthidae) from southeastern Mexico

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**Abstract.** *Chaneke fogoso* gen. nov. et sp. nov., are described based on specimens collected near the coast in southeastern Guerrero, Mexico. The genus is characterized by the peculiar rhomboidal shape of the subaculear tubercle, and the lack of at least one trichobothrium on the femur, patella and chela of the pedipalp, which make it the second known buthid genus with decreasing neobothriotaxy on those three pedipalpal segments, together with *Alayotityus* Armas 1973. *Tityopsis aliciae* Armas & Martin-Frias 1998, from Oaxaca, Mexico, is transferred to the new genus, resulting in *Chaneke aliciae* (Armas & Martin-Frias 1998), comb. nov. A cladistic analysis including all other New World "microbuthids" with decreasing neobothriotaxy, with 30 morphological characters, indicates that *Chaneke* is monophyletic, clearly distinct from *Alayotityus* Armas 1973 (from eastern Cuba) and *Tityopsis* Armas 1974 (from western Cuba).

**Keywords:** Decreasing neobothriotaxy, femur, patella, chela

The scorpion family Buthidae C. L. Koch 1837 contains approximately 90 genera (Ove-Rein 2014), approximately two-thirds of which have the β trichobothrial pattern on the pedipalp femur, and a third of which have the α trichobothrial pattern (Vachon 1975). In the New World, there are 11 buthid genera represented, one with the β pattern and the remaining 10 with the α pattern. Six of those genera are orthobothriotaxic: femur with 11 trichobothria (=τ), patella with 13 τ, chela with 15 τ; and four genera have decreasing neobothriotaxy (=less than the "full" compliment noted above) on some or all of their species. *Alayotityus* Armas 1973 lacks femoral τ $d_2$ and patellar τ $d_2$; *Mesotityus* Gonzalez-Sponga 1981 lacks patellar τ $d_2$ and chela τ $Eb_3$; *Microtityus* Kjellesvig-Waering 1966 has variable femoral and chelal trichobothrial numbers, but the patella is always orthobothriotaxic (τ $d_2$ present); *Zabius* Thorell 1893 lacks femoral τ $d_2$ and chela τ *esb*, but its three species have patellar τ $d_2$ present, although reduced in size (=petite), and chela τ $Eb_3$ present.

The genus *Tityopsis* Armas 1974 has two species from western Cuba that are orthobothriotaxic, and a Mexican species that, although it was originally described as being orthobothriotaxic (Armas & Martín-Frías 1998), was recently redescribed and shown to be neobothriotaxic (Vidal-Acosta & Francke 2009). Another neobothriotaxic species was recently collected in the state of Guerrero, Mexico (Figs. 1, 2), which is undoubtedly congeneric with *Tityopsis aliciae* Armas & Martín-Frías 1998, from the state of Oaxaca (Fig. 3); these two Mexican species differ from *Tityopsis* in being neobothriotaxic. The objectives of this contribution are: (a) to analyze the phylogenetic relationships of the two neobothriotaxic Mexican species with other New World buthids which have an α trichobothrial pattern on the femur, (b) to deseribe a new genus for those two Mexican species, and (c) to describe the new species from Guerrero.

## METHODS

**Specimens.**—The specimens used in this study are lodged in the following institutions: American Museum of Natural History, New York, USA (AMNH); Centro Oriental de Ecosistemas y Biodiversidad, Santiago de Cuba, Cuba (BIOECO); Colección Nacional de Arácnidos, Univ. Nacional Autónoma de México, México, D. F. (CNAN); Laboratorio de Entomología, Instituto de Diagnóstico y Referencia Epidemiológicos, Secretaria de Salud, México, D. F (INDRE); private collection Rolando O. Teruel, Cuba (ROT).

Specimens examined are listed in Appendix 1, including the first known male of *T. aliciae*. Nomenclature and mensuration for the most part follow Stahnke (1970), with the following exceptions: metasomal carinal terminology after Francke (1977), carinal terminology of pedipalp femur and patella after Acosta et al. (2008) and trichobothrial terminology after Vachon (1974, 1975). Observations, measurements and drawings were made using a Nikon SMZ800 stereomicroscope fitted with 10× oeular mierometer and camera lucida; photographs were made using a Nikon Coolpix S10 adapted to the same microscope.

**Taxon sampling.**—The cladistic analysis presented is based on 25 terminal taxa (Appendix 1). Trees were rooted using the out-group method (Watrous & Wheeler 1981; Farris 1982; Nixon & Carpenter 1993). The in-group includes all New World genera of the family Buthidae with non-imbricated rows of denticles on the pedipalp chela fingers and which lack supernumerary denticles along those rows. Three taxa which have supernumerary denticles are used as out-groups: *Rhopalurus junceus* (Herbst 1880); *Centruroides exilicauda* (Wood 1863), type speeies of the genus; and *Centruroides gracilis* (Latreille 1804), a rather divergent taxon from the type species of the genus. The tree was rooted with *Ananteris platnicki* Lourenço 1993, which is the New World genus of buthids with a femoral β trichobothrial pattern and thus distantly related.

**Character matrix.**—Character data were edited using WinClada, version 1.00.08 (Nixon 2002). The character matrix (Appendix 2) comprises 30 characters, eight coded into multistates and 22 coded into binary states. All charaeters (Appendix 3) are informative and are included in all the analyses and statistics. Multistate characters were treated as

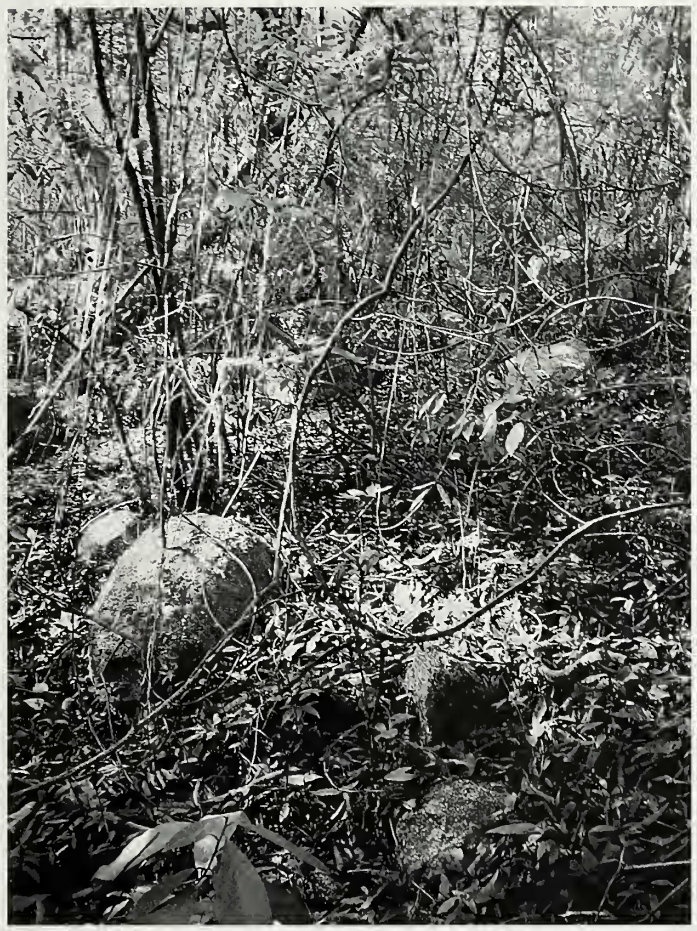

Figure 1.—Habitat at type locality of *Chaneke fogoso* gen. nov. et sp. nov.

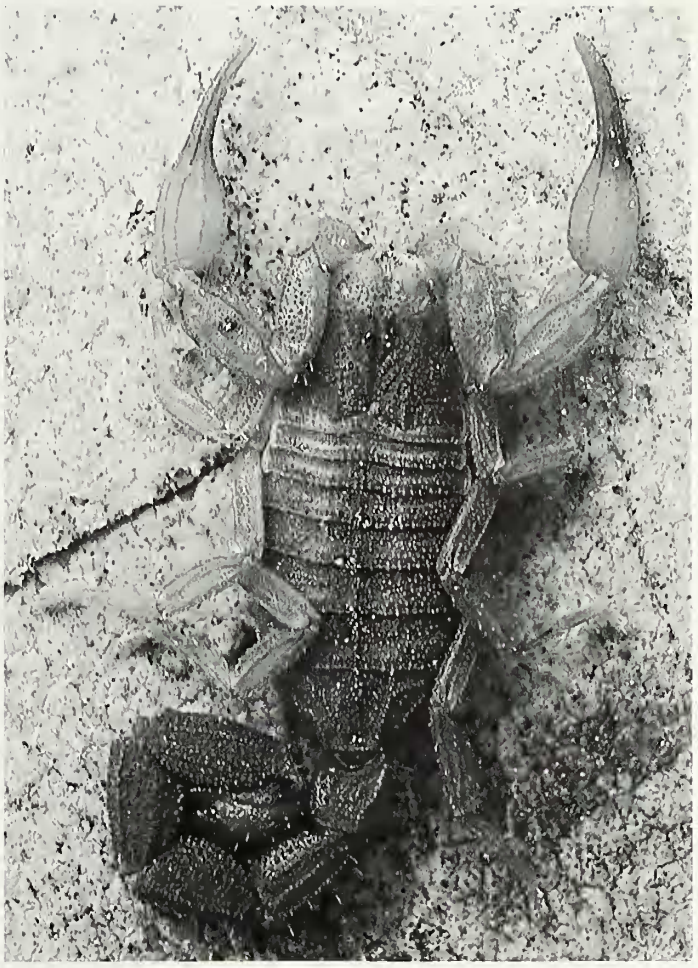

Figure 2.—Live habitus of *Chaneke fogoso* gen. nov. et sp. nov., dorsal view, paratype ♀ (CNAN).

unordered/non-additive (Fitch 1971), defended by invoking the principle of indifference, which asserts that if there is no apparent reason for considering one event to be more probable than its alternatives, then all should be considered equiprobable (Wilkinson 1992).

**Cladistic analyses.**—Analyses were conducted with parsimony and equal weighting or implied weighting with six values of the concavity constant ($k$) = 1, 3, 10, 30, 60 and 100, to assess the effect of weighting against homoplasious characters (as in Prendini et al. 2010). All analyses were conducted with TNT ver 1.1 (Goloboff et al. 2008), using a driven search combining three of the new technology algorithms (excluding ratchet) using a script file modified from Dimitrov et al. (2013) and Santibáñez-López et al. (in press): *hold 90000; rseed1; xm: noverb nokeep; rat: it 0 up 4 down 4 au 0 num 36 give 99 equa; dri: it 10 fit 1.00 rfi 0.20 aut 0 nuu 36 give 99 xfa 3.00 equa; sect:slack 20; sec: nins 45 maxs 45 self 43 incr 75 minf 10 god 75 drift 6 glob 5 dglob 10 rou 3 xss 10- 14+2 uoxev noeq; tf: rou 5 ninf 3 best ke nocluo swap; xm : level 10 nocluk rep 50 fuse 3 dri 10 rss css noxss uult nodump conse 5 conf 75 nogive notarg upda autoc 3 xuix; xm; xuult;;*. The relative support for each node was calculated in TNT using 1000 Jackknife pseudoreplicates (for equal weighting) and symmetric resampling (for implied weighting) with heuristic searches, consisting of ten random addition sequences, followed by ten iterations of tree bisection-reconnection, retaining one tree at each iteration (Dimitrov et al. 2013), and Bremer support (Bremer 1994), searching suboptimal trees up to six steps longer, retaining 1000 trees at each iteration. A preferred hypothesis was selected among the alternative topologies recovered by the analysis with equal weighting.

## RESULTS

**Cladistic analyses.**—The analysis with equal weighting produced two most parsimonious trees (strict consensus tree shown in Fig. 4, Table 2). The monophyly of *Chaneke* gen. nov. was recovered by high jackknife and Bremer support values, and it was placed as sister group of the genus *Alayotityus*. *Chaneke* gen. nov. was supported by the following characters: (1) the lateral ocelli small and hidden from dorsal view by a crest (char. 2); (2) carapace without keels (char. 4); (3) one tergal carinae (char. 5); (4) male genital papillae without a distinct, fleshy point (char. 7); (5) subaculear tubercle trapezoidal, with two granules (char. 18); (6) males with basal lobe on movable finger (char. 20); (7) femoral $\tau$ i3 petite (char. 25) and (8) by the absence of chela $\tau$ $Eb_3$ (char. 27; see figure 11). Genus *Tityopsis* was recovered monophyletic with high jackknife and Bremer support values, and it was placed as sister of the clade formed by genera *Zabius*, *Microtityus*, *Chaneke* and *Alayotityus* (see Fig. 4).

The analyses with implied weighting under four values of the concavity constant ($k$ = 10, 30, 60 and 100) recovered two trees,

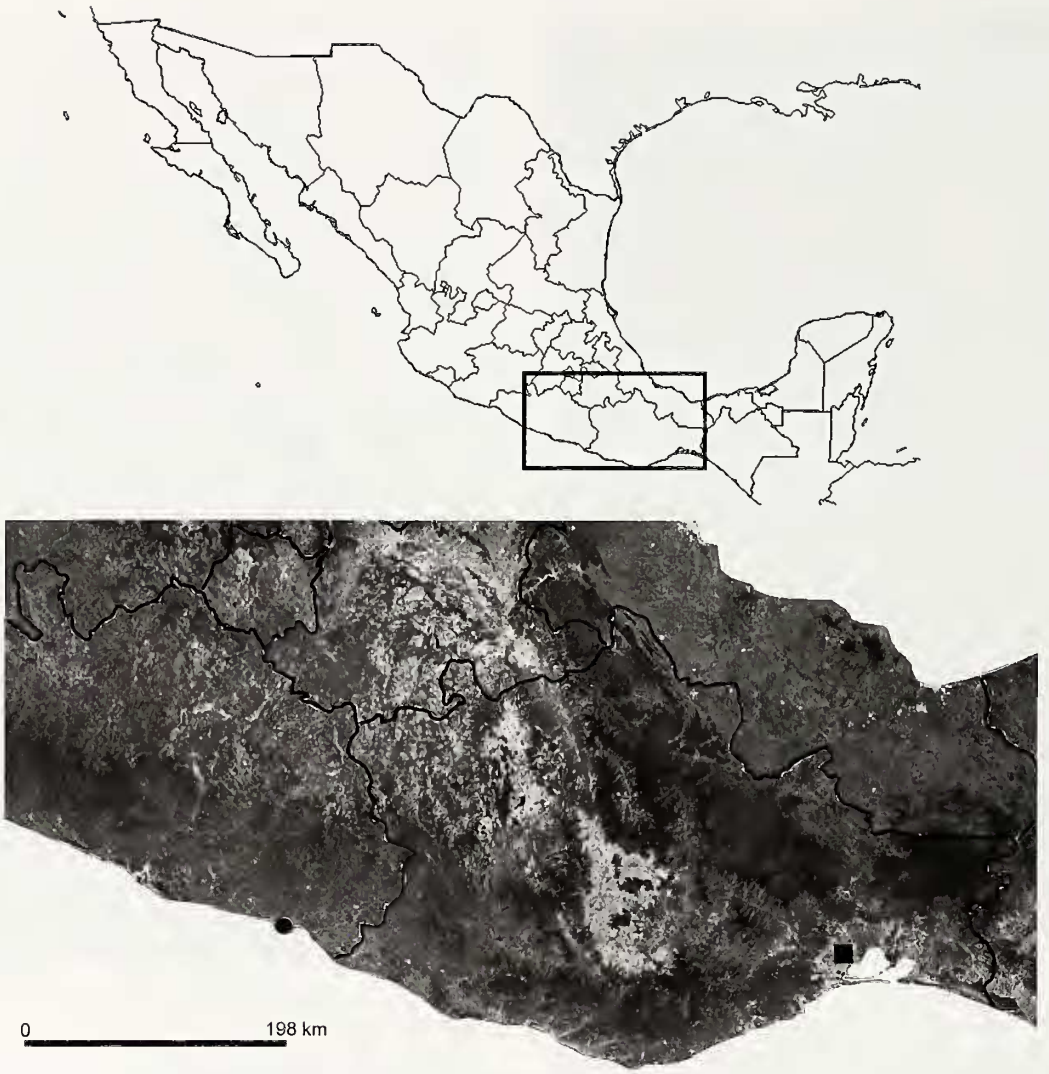


Figure 3.—Map of Oaxaca and Guerrero area plotting known locality records for the two species of *Chaneke* gen. nov.: *Chaneke fogoso*, sp. nov. (circle), *Chaneke aliciae* (Armas & Martin-Frias), comb. nov. (square).

with the same topologies as in the analysis with equal weighting (Table 2). However, analyses with implied weighting under two values of the concavity constant ($k$ = 1 and 3) recovered three most parsimonious trees (strict consensus shown in Fig. 5; Table 2). The monophyly of *Chaneke* gen. nov. was recovered with high jackknife and Bremer support values, and it was placed as a sister group of the clade formed by genera *Tityopsis*, *Microtityus*, *Zabius* and *Alayotityus* as follows: (*Chaneke* gen. nov. (*Tityopsis* (*Microtityus* (*Zabius* + *Alayotityus*)))). Under those two analyses ($k$ = 1 and 3), *Chaneke* gen. nov. was supported by the following characters (1) the trapezoidal shape of the carapace (char. 0); (2) the lateral ocelli small, dorsally covered by a crest, visible in frontal aspect (char. 2); (3) carapace without keels (char. 4); (4) male genital papillae without a distinct, fleshy point (char. 7); (5–6) males and females with a whitish patch on sternite (chars. 10; 14); (7) males with basal lobe on movable finger (char. 20).

None of these analyses recovered *Chaneke* gen. nov. as sister group of *Tityopsis*, and the creation of this new genus, along with the transfer of *Tityopsis aliciae* (=*Chaneke aliciae*, new combination) to the new genus, are well supported. The preferred tree is the strict consensus from the analyses without weighting and those recovered with concavity values of $k$ = 10, 30, 60 and 100 (Fig. 4), which place *Chaneke* as sister group of *Alayotityus*. These two genera share: (1) males with whitish patch on sternite III (char. 10); (2) females with whitish patch on sternite III (char. 14); (3) femoral $\tau$ $i_3$ petite (char. 24); and (4) patella $\tau$ $d_2$ absent (char. 26). However, the position of *Chaneke* gen. nov. within the family remains unresolved pending a further study with the inclusion of more genera of buthids.

## SYSTEMATICS

### Family Buthidae C.L. Koch 1837

### Genus ***Chaneke***, gen. nov.

*Tityopsis* (in part): Armas & Martín-Frías 1998:45; Vidal-Acosta & Franeke 2009:338.

**Type species.**—*Chaneke fogoso,* sp. nov.

**Other included species.**—*Chaneke aliciae* (Armas & Martín-Frías, 1998), comb. nov.

**Etymology.**—"Chanekes" are legendary creatures in Mexican folklore, dating to Aztec times. They are conceived as

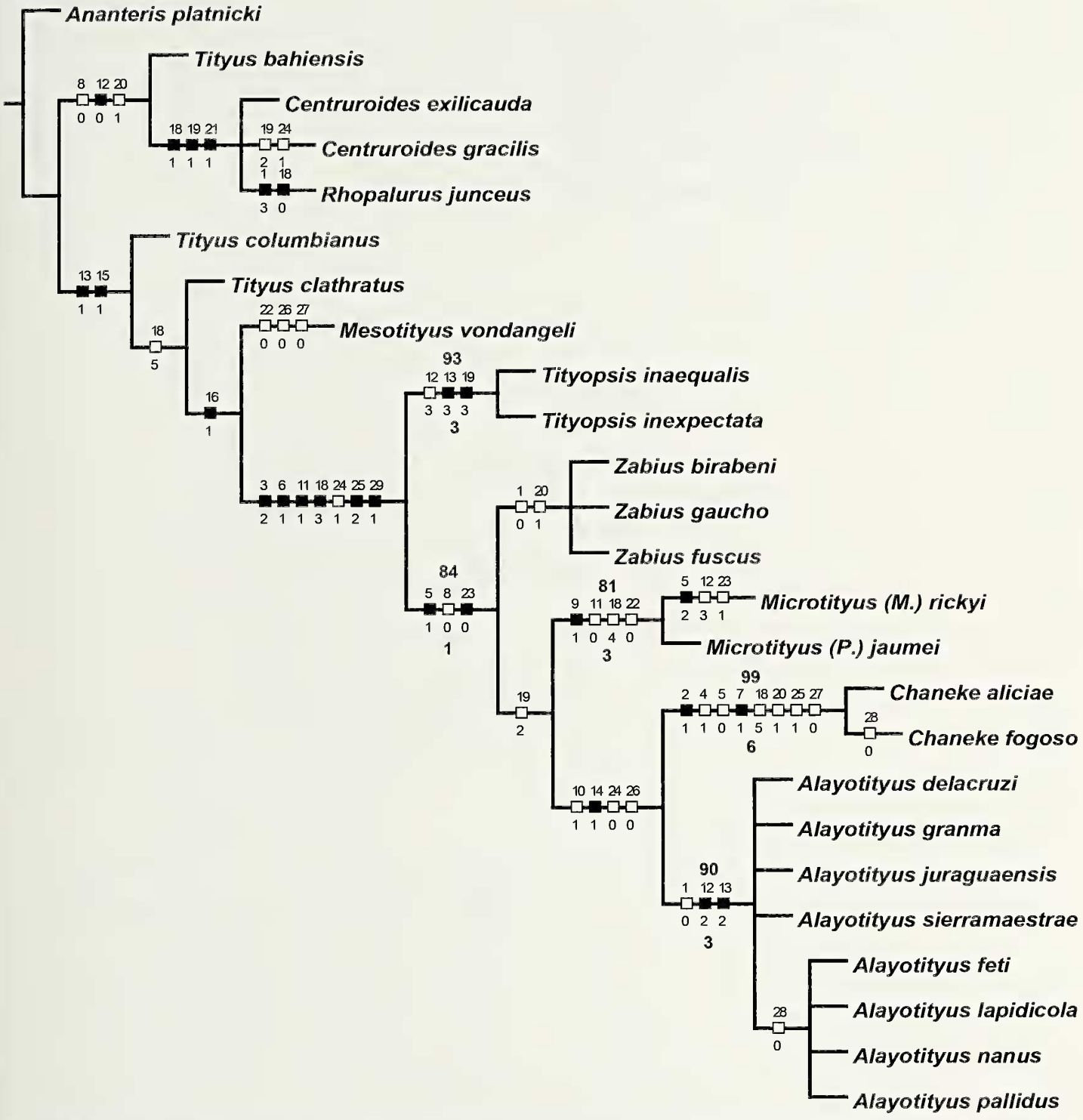


Figure 4.—Strict consensus tree from two equally parsimonious trees (length, 69; CI, 0.652; RI, 0.878; Fit, 24.55) obtained by the analysis of 30 morphological characters for 25 species in 11 buthid scorpion genera, with equal weighting, and with weighting concavity values of $k = 10$, 30, 60 and 100. Unambiguous morphological synapomorphies optimized on branches: black squares indicate synapomorphies, white squares indicate homoplasies; numbers above squares indicate characters, numbers below indicate states (see Appendix 3). Jackknife values greater than 50% indicated above branches. Bremer support values indicated below branches.

small, sprite-like beings, elemental forces and guardians of nature. It is used as a noun in apposition, and is considered masculine in gender.

**Diagnosis.**—Relatively small-sized buthid scorpions (adults approx. 2 cm long—Table 1) with decreasing neobothriotaxy A $\alpha$: pedipalp femur lacking $\tau$ $d_2$, patella lacking $\tau$ $d_2$, chela lacking $\tau$ $Eb_3$. The eight known species of *Alayotityus* lack femoral $\tau$ $d_2$ and patellar $\tau$ $d_2$, but have chelal $\tau$ $Eb_3$; the three known species of *Zabius* lack femoral $\tau$ $d_2$, but have patellar $\tau$ $d_2$ and chelal $\tau$ $Eb_3$; the two known species of *Tityopsis* are

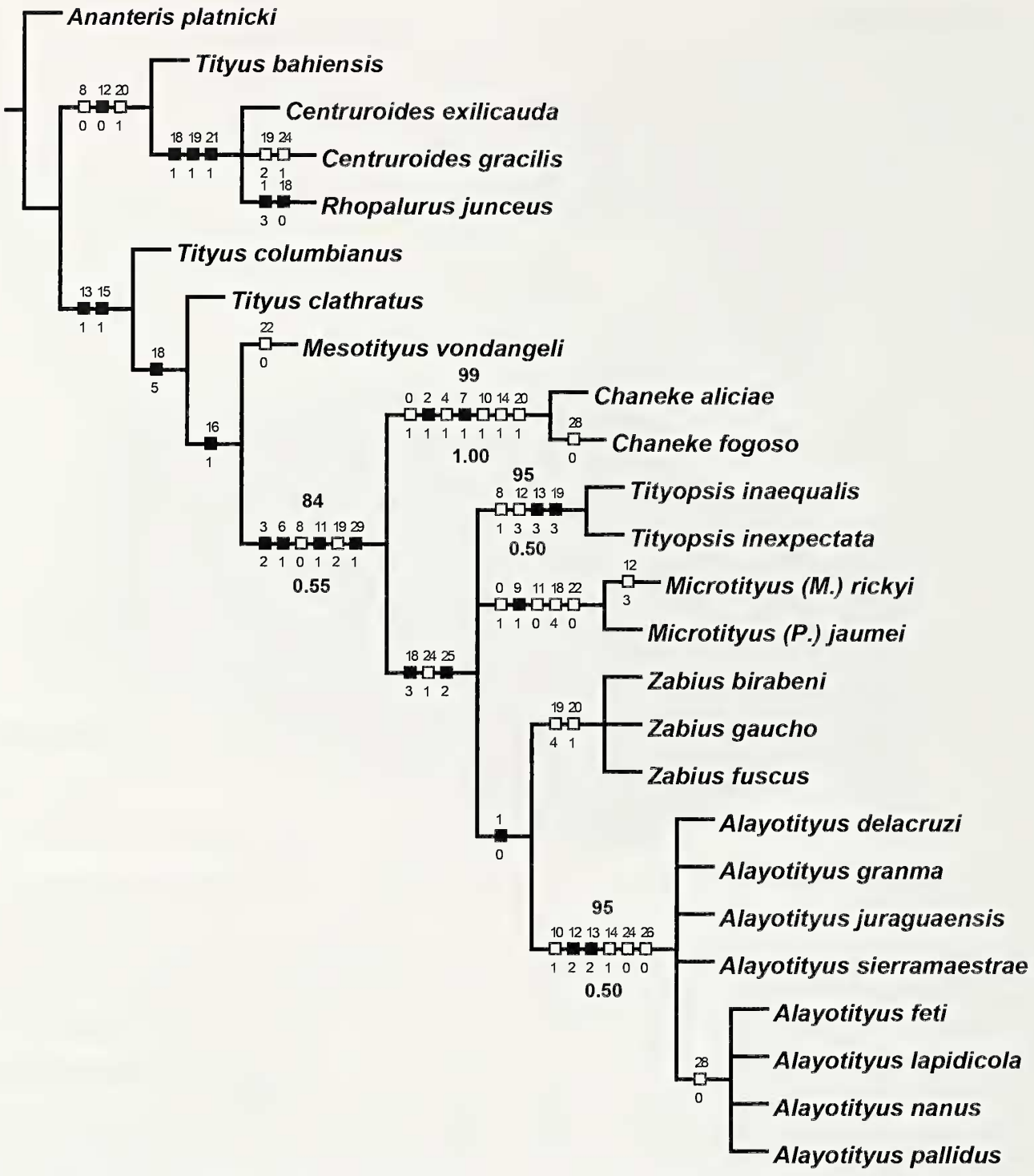


Figure 5.—Strict consensus tree from three most parsimonious trees (length, 71; CI, 0.634; RI, 0.867; Fit, 24.35; Adjusted Homoplasy, 5.65) obtained by the analysis of 30 morphological characters for 25 species in 11 buthid scorpion genera, with weighting concavity values of $k = 1$ and 3. Unambiguous morphological synapomorphies optimized on branches: black squares indicate synapomorphies, white squares indicate homoplasies; numbers above squares indicate characters, numbers below indicate states (see Appendix 3). Jackknife values greater than 50% indicated above branches. Bremer support values indicated below branches.

orthobothriotaxic. Tergites with a single, median longitudinal carina; whereas *Alayotityus* and *Zabius* have three carinae, *Tityopsis* only one, and *Microtityus* three or five. Metasomal segment V without lateral carinae; *Zabius* and *Microtityus* also lack such carinae, *Alayotityus* and *Tityopsis* always have well defined lateral carinae. Subaculear tubercle very large and rhomboid in lateral view, considerably deeper than wide; *Alayotityus*, *Tityopsis* and *Zabius* all have a subaculear tubercle which may be obsolete to moderately developed, but is always blunt conical. Fixed finger of the pedipalp chela with 9–10 slightly imbricated rows of denticles; *Alayotityus* also has 9–10, *Zabius* and *Tityopsis* have 11–12. Dentition on

Table 1.—Measurements in mm of *Chaneke fogoso* sp. nov. L = length, W = width.

| | | Holotype | Paratype | Paratype | Paratype |
|---|---|---|---|---|---|
| | | male | male | female | female |
| Total | L | 19.7 | 20.6 | 21.3 | 20.2 |
| Carapace | L | 2.8 | 2.9 | 3 | 2.9 |
| | W | 2.4 | 2.3 | 2.5 | 2.4 |
| Mesosoma | L | 6.5 | 6.7 | 7.3 | 7.3 |
| Metasoma | L | 10.4 | 11 | 11 | 10 |
| I | L | 1.5 | 1.6 | 1.6 | 1.5 |
| | W | 1.7 | 1.7 | 1.7 | 1.6 |
| II | L | 1.9 | 2 | 2 | 1.8 |
| | W | 1.6 | 1.5 | 1.5 | 1.4 |
| III | L | 2 | 2.1 | 2.2 | 2 |
| | W | 1.5 | 1.5 | 1.5 | 1.3 |
| IV | L | 2.3 | 2.4 | 2.4 | 2.2 |
| | W | 1.5 | 1.5 | 1.4 | 1.3 |
| V | L | 2.7 | 2.9 | 2.8 | 2.5 |
| | W | 1.5 | 1.5 | 1.4 | 1.3 |
| Telson | L | 2.4 | 2.5 | 2.6 | 2.3 |
| | W | 1 | 1.1 | 1.1 | 1.1 |
| Pedipalp | L | 9.4 | 9.7 | 10.3 | 9.7 |
| Femur | L | 2.3 | 2.4 | 2.5 | 2.4 |
| | W | 0.8 | 0.9 | 0.9 | 0.9 |
| Patella | L | 2.7 | 2.7 | 3 | 2.8 |
| | W | 1.1 | 1.2 | 1.2 | 1.2 |
| Chela | L | 4.1 | 4.6 | 4.8 | 4.5 |
| | W | 1.5 | 1.6 | 1.3 | 1.3 |

the fingers of the pedipalp chela without supernumerary denticles flanking the primary rows (Figs. 9B, C).

**Distribution.**—Known only from the Mexican states of Guerrero and Oaxaca, along the southern Pacific Coast (Fig. 3).

***Chaneke fogoso***, sp. nov.
Figures 1–6, 8–11 Table 1

**Type data.**—MEXICO: *Guerrero*: Municipio de Copala: Holotype adult ♂, Microondas Fogos (approx. 15 km ESE Copala), 16° 33.992′N, 98° 53.301′W, 103 m, 31 Aug 2008, U.V. detection, O.F. Francke, H. Montaño, C. Santibáñez & A. Valdez (CNAN T–0630). Paratypes: 19 adult ♂, 1 subadult ♂, 3 adult ♀, 3 subadult ♀, 2 juveniles, same data as holotype (1 ♂, 1 ♀ each at AMNH and BIOECO; remainder at CNAN T–0631); 1 adult ♂ (U.V.), 1 adult ♀ (sifting leaf litter), same locality, 6–7 July 2008, O.F. Francke, C. Santibáñez & A. Quijano (CNAN T–0632); 1 subadult ♂ (U.V.), same loeality, 26 June 2007, O.F. Francke, L. Escalante, J. Ballesteros & H. Montaño (CNAN T–0633).

**Diagnosis.**—*Chaneke fogoso* has 10 primary rows of denticles on both fixed and movable fingers of the pedipalp chela, whereas *Ch. aliciae* has only nine. Pectinal tooth count on males 9–11 (mode = 10), on females 8–9 (tied); *Ch. fogoso* lacks τ *Esb* on the manus and τ *esb* on the fixed finger of the pedipalp chela, whereas *Ch. aliciae* has τ *Esb* and τ *esb* present. In addition, *Ch. fogoso* is in general smaller and has a less robust metasoma than *Ch. aliciae* (Figs. 6, 7), but also possesses the smooth, whitish patch of sternite V remarkably larger and bulkier in adults of both sexes.

Table 2.—Tree statistics for phylogenetic analysis of 25 species in 10 New World buthid scorpion genera. Length, consistency index (CI), retention index (RI), Fit and adjusted homoplasy (AH) of most parsimonious trees (MPTs) obtained by the analyses of the morphological under equal weighting (EW) and implied weighting (IW), with six concavity values (k).

| | | MP | L | CI | RI | FIT | AH |
|---|---|---|---|---|---|---|---|
| EW | | 2 | 69 | 0.652 | 0.878 | 24.55 | |
| IW | k=100 | 2 | 69 | 0.652 | 0.878 | 29.76 | 0.24 |
| IW | k=60 | 2 | 69 | 0.652 | 0.878 | 29.61 | 0.39 |
| IW | k=30 | 2 | 69 | 0.652 | 0.878 | 29.24 | 0.76 |
| IW | k=10 | 2 | 69 | 0.652 | 0.878 | 27.91 | 2.09 |
| IW | k=3 | 3 | 70 | 0.643 | 0.872 | 24.6 | 5.4 |
| IW | k=1 | 3 | 70 | 0.643 | 0.872 | 24.6 | 5.4 |

**Etymology.**—The specific name is a noun in apposition, "fogoso" in Spanish means "fiery", "feisty" or "lit-on-fire", befitting the generic name; in addition, it alludes to the type locality.

**Description.**—*Holotype male* (Figs. 6A, B): Coloration: Base color light yellow (straw-colored). Prosoma: carapace with dense, variegated fuscosity (Figs. 6A, C); venter pale yellow (Figs. 6B, D). Mesosoma: tergites I–VI with two complete, transverse fuscous bands—one on all of pre-tergite, the other on distal one-half of post-tergite; tergite VII with pre-tergite infuscate, and post-tergite with middle, posterior and lateral areas infuscate; ventrally pale yellow. Metasomal segments I–IV faintly, uniformly infuscate on ventromedian, posterior one-halves of ventrolateral and lateral inframedian, and distally on lateral supramedian intercarinal spaces; segment V and telson straw colored. Chelicerae not infuscate. Pedipalps with diffuse, uniform fuscosity, dorsally on trochanter, femur and patella; fingers on chela pale reddish brown, feebly infuscate. Legs infuscate on prolateral regions.

Carapace: Coarsely, densely granulose throughout (Fig. 8A). Anterior margin bilobed, with shallow median notch; with four short, blunt-tipped setae. Three subequal ocelli on each side. Median eyes slightly anterior to one-half the carapace length. Two moderately strong, longitudinal, submedian carinae on posterior one-fifth. Ventrally with numerous reddish setae of various sizes, some pointed, some blunt.

Mesosoma: Tergites with pre-tergite densely, minutely granulose; anterior one-half of post-tergite sparsely granulose, shiny; posterior one-half densely, coarsely granulose, matte. One coarsely granulose median carinae present on distal one-half of post-tergites I–VI. Tergite VII paramedian and lateral carinae well-developed, coarsely granulose. Sternum subpentagonal (Figs. 6B, D); with deep indentation posteromedially; three pairs of setae. Genital opercula completely separated, with five and six setae respectively; genital papillae without sharp, pointed end. Pectinal basal piece wider than long, with shallow anteromedian notch; posterior margin straight (Fig. 8B). Pectinal tooth count 9–10. Sternites moderately granulose, with scattered reddish setae throughout; stigmata small, oval-elongate. Sternite III with two anterolateral depressions underneath the pectines (where these structures presumably fit when the animal is at rest). Sternite V with a conspicuous, circular, white, shiny patch medially along posterior margin (Fig. 6B). Sternite VII submedian carinae

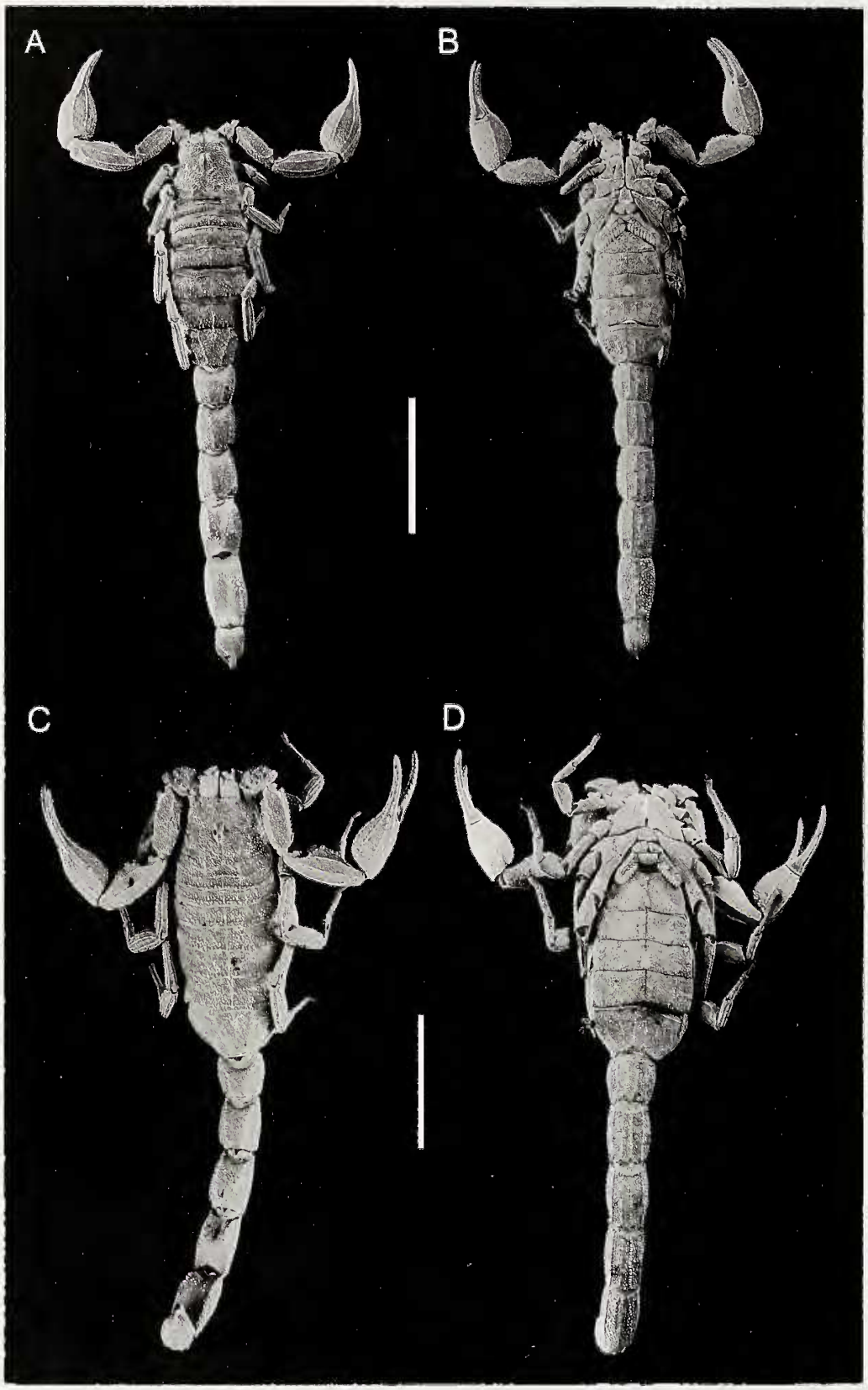


Figure 6.—*Chaneke fogoso* gen. nov. et sp. nov., habitus, dorsal aspect (A, C) and ventral aspect (B, D). A, B. Holotype ♂ (CNAN); C, D. Paratype ♀ (CNAN). Scale bar = 5 mm.

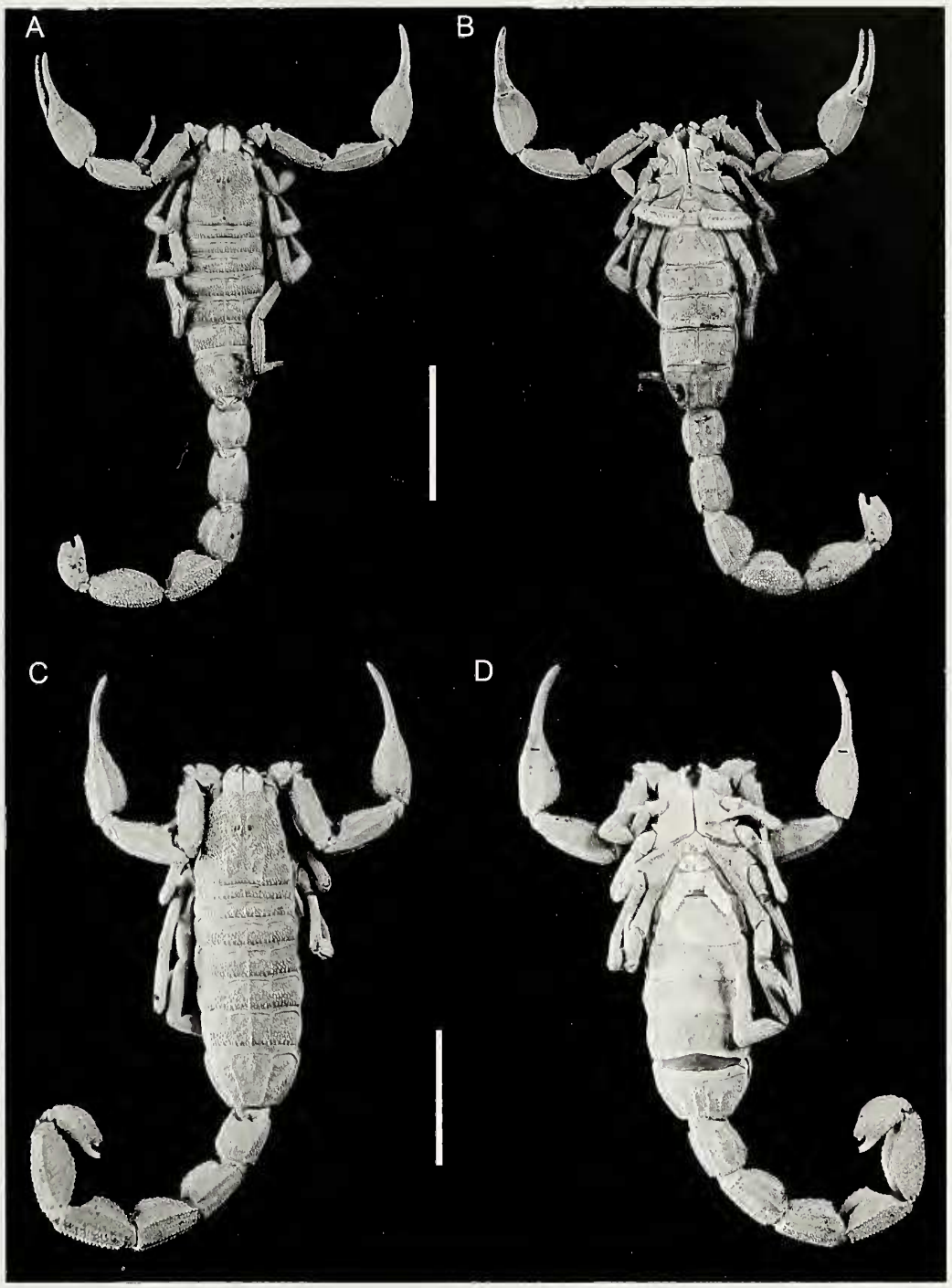


Figure 7.—*Chaneke aliciae* (Armas & Martín-Frías 1998), comb. nov., habitus, dorsal aspect (A, C) and ventral aspect (B, D). A, B. ♂ (CNAN); C, D. ♀ (CNAN). Scale bar = 5 mm.

granulose, well-defined and reaching posterior margin; lateral carinae barely discernible as short row of five granules submedially, absent on basal and distal thirds.

Metasoma: Segments I–IV with dorsolateral, lateral supramedian, ventrolateral and ventral submedian carinae strong, crenulate; lateral inframedian carinae complete, crenulate on I–II, absent on III–IV; intercarinal spaces moderately granulose. Segment V (Fig. 9A) dorsolateral, ventrolateral and ventromedian carinae strong, granulose; lateral carinae absent; intercarinal spaces densely, coarsely granulose. Telson globose; ventrally weakly to vestigially granulose; subaculear tubercle flat, crest-like, its width same as that of base of aculeus, ending in a small finger-like projection that points towards middle of aculeus (Fig. 9A).

Chelicera: Fixed finger with three dorsal teeth; on right side basal tooth is a bicusp, on left side a sharp monoeusp; ventrally with a single small tooth at level of middle dorsal tooth. Movable finger with distal tines subequal; dorsally with

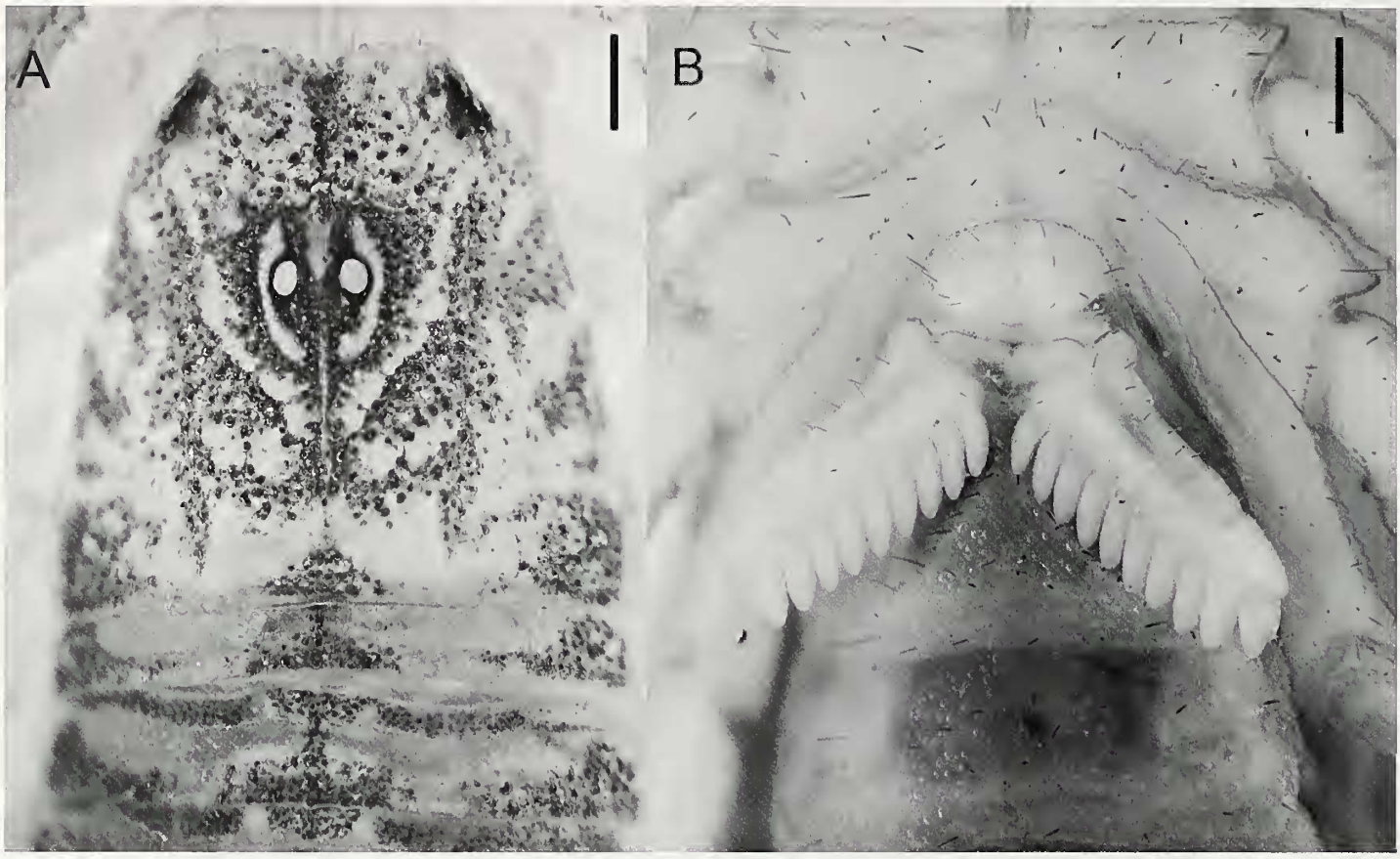


Figure 8.—*Chaneke fogoso* gen. nov. et sp. nov., holotype ♂ (CNAN). A. Carapace, dorsal aspect; B. Pectinosternal region. Scale bars = 0.5 mm.

a basal bicusp characteristic of the family; ventrally with two small teeth.

Pedipalp: Femur with prodorsal, retrodorsal, anteromedian and proventral carinae strong, granulose; intercarinal spaces moderately to densely granulose, with few clavate setae distally. Neobothriotaxia A alpha: $d_2$ absent, $i_3$ and $i_4$ petite (Fig. 10A). Tibia heptacarinate, all carinae strong, granulose; dorsal intercarinal spaces densely granulose, others moderately to sparsely so, with scattered clavate setae throughout. Neobothriotaxia A: $d_2$ absent, no petite trichobothria (Figs. 10C, D). Chela with nine carinae, smooth to feebly crenulate; intercarinal spaces with moderately dense, small granulation; with moderately dense, clavate setae throughout, including both fingers. Movable finger with 10 imbricated principal rows of granules, flanked by 11 inner and nine outer accessory granules (Fig. 9B), the apical subrow (excluded from counts) is composed by four granules located just basal to the terminal denticle. Fixed finger with 10 imbricated principal rows of granules, flanked by 11 inner and nine outer accessory granules (Fig. 9C). Neobothriotaxia A: lacking $Eb_3$, *Esb* and *esb* (Figs. 11A, B).

Legs: Tibial spurs absent on all legs; prolateral and retrolateral pedal spurs present on all legs. Patellae and tibiae with scattered clavate setae; tarsi with moderately dense, pointed setae.

**Variability.**—Pectinal tooth counts varied as follows: on males three combs with nine teeth (7.5%), 22 with 10 (55.0%) and six with 11 (37.5%); on females six combs with eight teeth (50%) and six with nine (50%).

**Variation.**—Pedipalp finger dentition was analyzed on six males and six females (both right and left fingers checked for each specimen). The number of denticle rows on the fixed finger was 10 on the 24 fingers checked; the number of inner accessory granules was 10 on females (10 fingers with 10 granules, two fingers with 11) and 11 on males (two fingers with 10 granules and 10 fingers with 11 granules), and the number of outer accessory granules was 10 with no apparent sexual dimorphism (three fingers with nine granules and 21 fingers with 10). The number of denticle rows on the movable finger was 11 on the 24 fingers counted; the number of inner accessory granules was 11 on females (nine fingers with 11 granules and three fingers with 12) and 12 on males (12 out of 12), and the number of outer accessory granules was 11 with no apparent sexual dimorphism (20 fingers with 11 granules, four fingers [two male, two female] with 12 granules).

**Distribution.**—This species is only known from the type locality in the state of Guerrero (Fig. 3).

**Remarks.**—The locality where the new species was collected is a well-conserved, land-locked area; it is a small isolated hill (approx. 200 m high) along the coastal plains and has a microwave relay station on top. It is in private property, surrounded by pasture-land and scattered cultivation plots. The original vegetation on the plain and lower slopes is tropical deciduous scrub forest, whereas the upper reaches

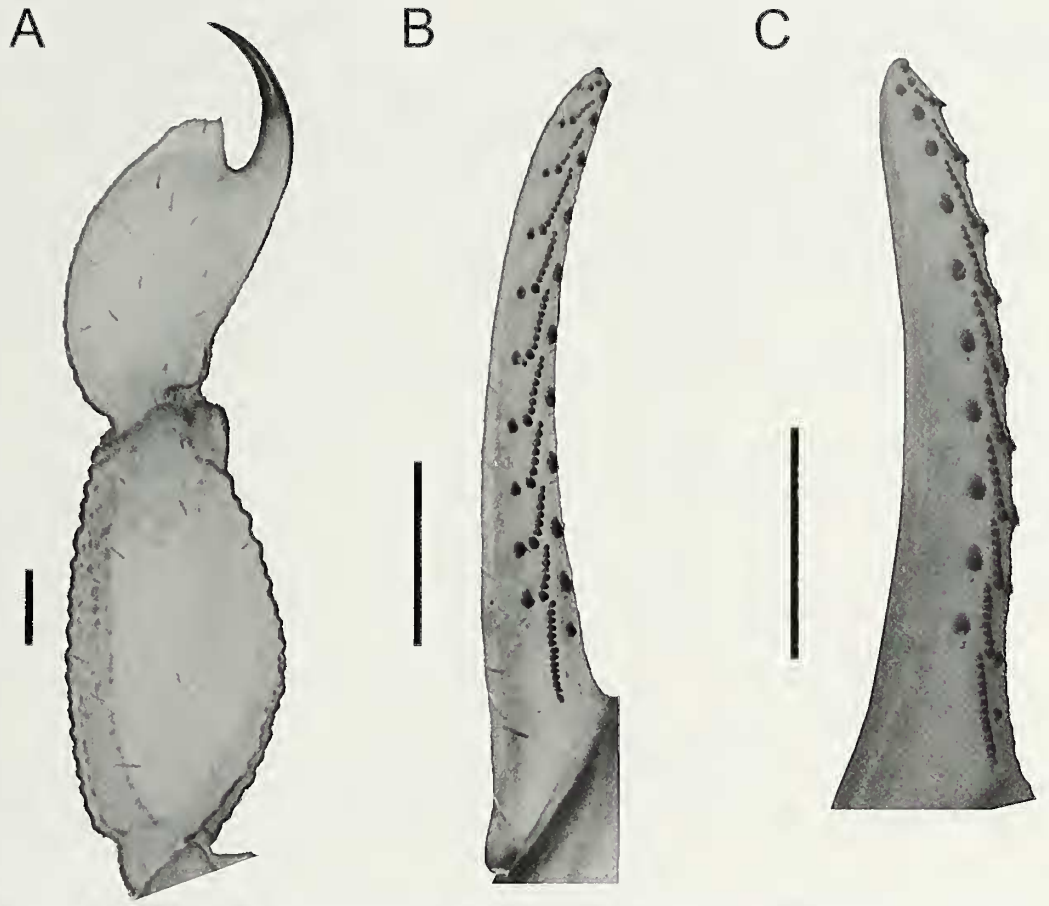


Figure 9.—*Chaneke fogoso* gen. nov. et sp. nov.: holotype ♂ (CNAN). A. Lateral aspect of distal portion of metasoma; B. Pedipalp chela movable finger showing dentition pattern; C. Pedipalp chela fixed finger showing dentition pattern. Scale bars = 0.5 mm.

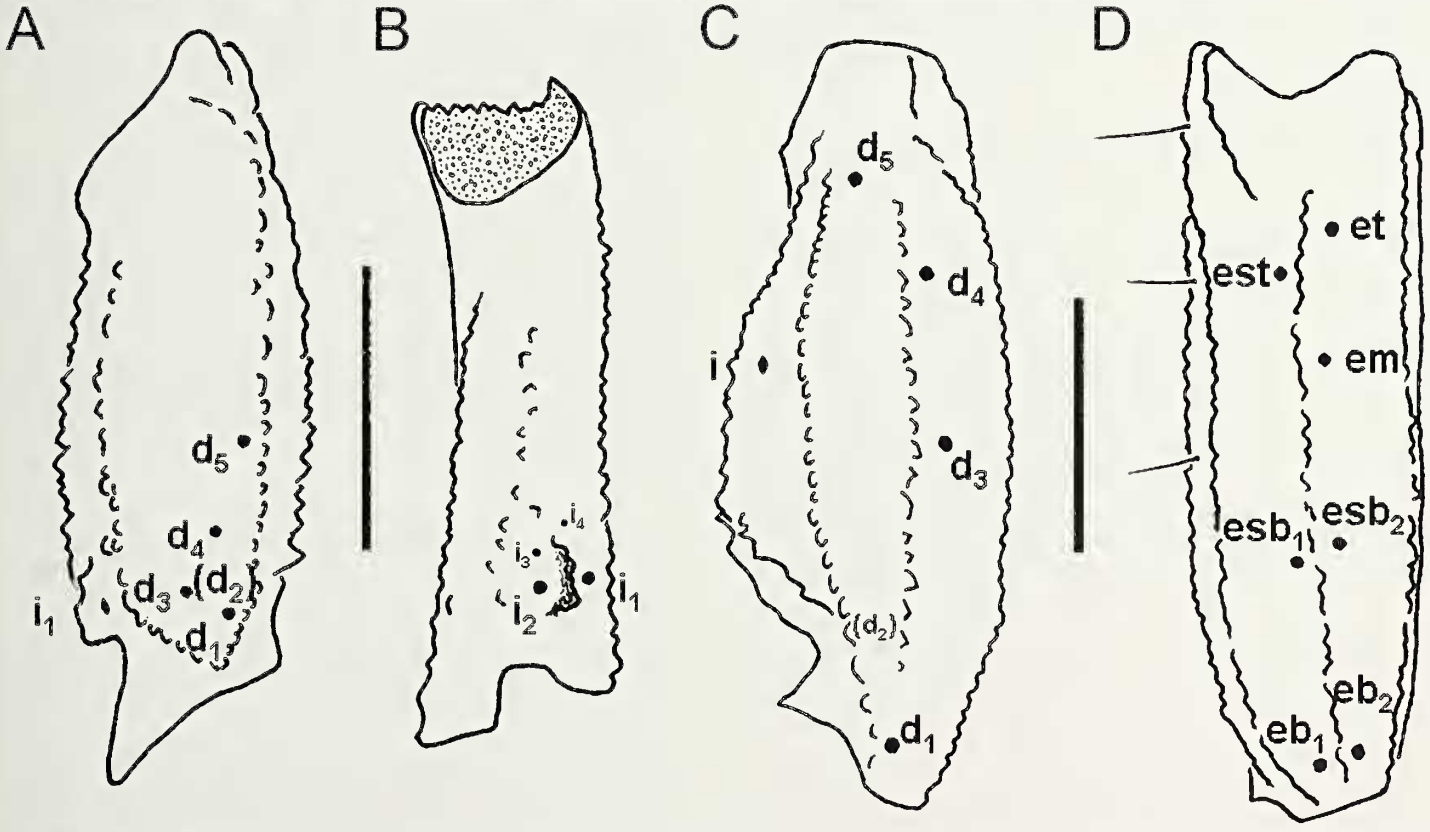


Figure 10.—*Chaneke fogoso* gen. nov. et sp. nov.: holotype ♂ (CNAN). A. Dorsal aspect of pedipalp femur, showing trichobothria ($d_2$ missing); B. Frontal aspect of pedipalp femur; C. Dorsal aspect of pedipalp patella; D. Posterior aspect of pedipalp patella. Scale bars = 1 mm.

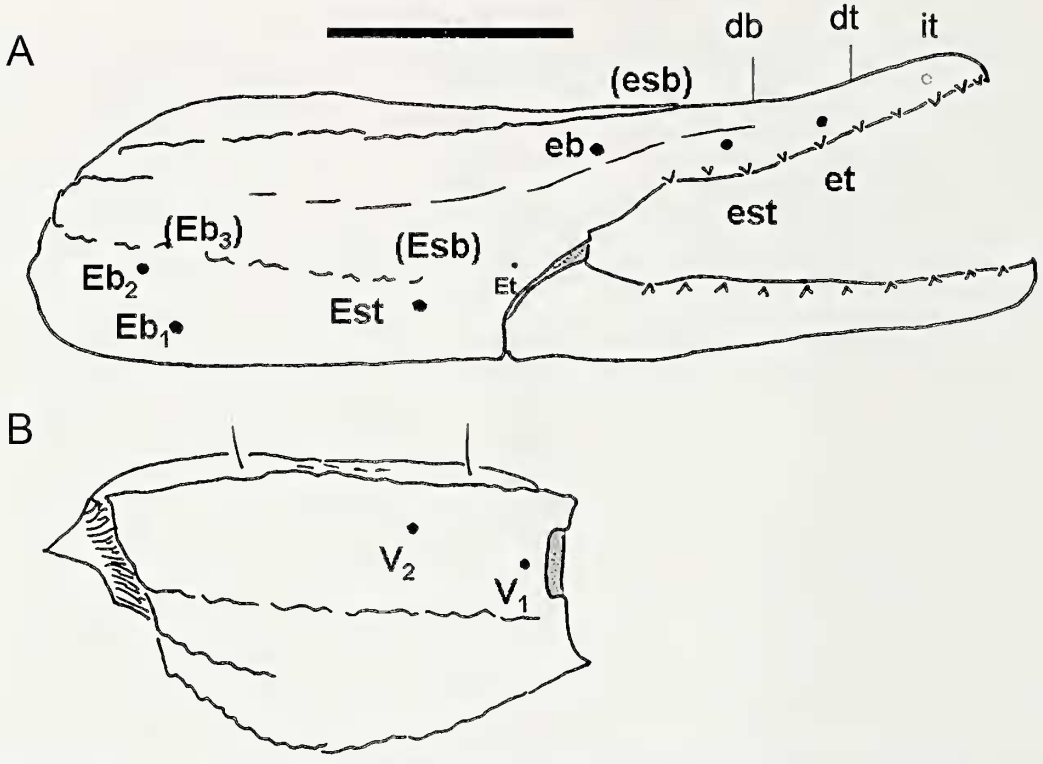


Figure 11.—*Chaneke fogoso* gen. nov. et sp. nov.: holotype ♂ (CNAN). A. External aspect of pedipalp chela showing trichobothria; B. Ventral aspect of pedipalp manus. Scale bars = 1 mm.

receive more moisture and have a mixed tropical lowland forest component. The upper habitat contains numerous large boulders, and in protected places the leaf-litter can reach 0.3–0.4 m in depth (Fig. 1). Most of the specimens were collected after abundant rains.

***Chaneke aliciae*** (Armas & Martín-Frías 1998), comb. nov.
Figures 3–5, 7

*Tityopsis aliciae* Armas & Martín-Frías 1998:45–49; Santibáñez-López & Ponce-Saavedra 2009:321; Vidal-Acosta & Francke 2009:333–339.

**Type data.**—MEXICO: *Oaxaca*: Municipio de Santo Domingo Tehuantepec: Holotype subadult ♀, [16.31°N, 95.23°W], 30 June 1938, no collector (CNAN–T0173); 1 adult ♀, Tehuantepec, Cima street #61, under bricks [16.31°N, 95.23°W], 12 Jan 2006, no collector (INDRE); 1 adult ♂, alrededores de Colonia Emiliano Zapata, 16.32026°N, 95.27899°W, 80 m, R. Paredes, C. Santibáñez, A. Valdez (CNAN); 1 adult ♀, 2 subadult ♀, km 23.5 road Salina Cruz to La Ventosa, 16.39754°N, 95.10094°W, 20 m, C. Santibáñez, R. Monjaraz, A. Valdez, M. Fuentes (CNAN).

**Diagnosis.**—*Chaneke aliciae* has nine primary rows of denticles on both fixed and movable fingers of the pedipalp chela, whereas *Ch. fogoso* has ten. Pectinal tooth count on males 10–11, on females 8–9; *Ch. aliciae* bears τ *Esb* on the manus and τ *esb* on the fixed finger of the pedipalp chela, whereas *Ch. fogoso* lacks τ *Esb* and τ *esb*. The sexual secondary dimorphism is slight (as usual for the other closely-related genera): adult males can be recognized by their more distally incrassate pedipalp chelae and metasoma, smaller mesosoma (Fig. 7), presence of genital papillae, and slight but consistently higher pectinal tooth counts.

**Distribution.**—This species is only known from the Santo Domingo Tehuantepec area, in the state of Oaxaca (Fig. 3).

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Appendix 1.—Specimens examined and/or references consulted during the construction of the character matrix.

1. *Ananteris platnicki* Lourenço 1993. COSTA RICA: *Provincia Puntarenas*: Quepos: El Silencio: Sendero Las Cataratas, 50–100 m, 6 Sept 2000, L. F. de Armas, C. Víquez, 1 ♂ (RTO: Sco–0446). Península de Osa: Puerto Jiménez: Río Agujas: Estación Agujas: Sendero Zamia, 300 m., 2–4 Oct 1997, A. Azofeifa, 1 ♀ (RTO: Sco–0189). *Provincia Limón*: Reserva Vegetal Hitoy Cerere: Valle de la Estrella, 4 March 1999, W. Arana, 1 ♀ (RTO: Sco–0190). Isla Uvita, May–July 2000, A. Berrocol, 1 ♀ (RTO: Sco–0191).
2. *Alayotityus delacruzi* Armas 1973. CUBA: *Santiago de Cuba*: Playa Siboney: Cueva de Los Majáes, 27 March 1998, R. Teruel, N. Navarro, 10 ♂, 3 ♀, 6 juv. topotypes (RTO). 18 May 2002, R. Teruel, M. Sobrino, 2 ♂, 4 ♀ topotypes (CNAN).
3. *Alayotityus feti* Teruel 2004. CUBA: *Santiago de Cuba*: La Socapa, 26 March 1999, R. Teruel, 1 ♂ holotype, 6 ♂, 8 ♀ paratypes (RTO).
4. *Alayotityus granma* Armas 1984. CUBA: *Granma*: Niquero: El Guafe, 2 km al norte de Cabo Cruz, 9–11 July 2000, R. Teruel, L. Montano, Y. Cala, R. Escalona, 8 ♂, 16 ♀, 3 juv. topotypes (RTO).
5. *Alayotityus juraguaensis* Armas 1973. CUBA: *Santiago de Cuba*: Playa Juraguá, 6–7 March 1992, R. Teruel, 1 ♂, 1 ♀, 8 juv. topotypes (RTO). Same data except 3 July 1992, R. Teruel, R. Ermus, 1 ♂, 2 ♀ topotypes (RTO).
6. *Alayotityus lapidicola* Teruel 2002. CUBA: *Santiago de Cuba*: Tercer Frente: La Pimienta, 20 April 2000, R. Teruel, R. Viña, A. Fong, 1 ♂ holotype, 5 ♀ paratypes (RTO).
7. *Alayotityus nanus* Armas 1973. CUBA: *Santiago de Cuba*: Puerto Boniato, 9 March 2003, R. Teruel, Y. Pérez, 2 ♂, 5 ♀ topotypes (BIOECO). *Santiago de Cuba*: 300 m N El Cobre, 9 Sept 2000, R. Teruel, Y. Pérez, 2 ♂, 5 ♀ (CNAN).
8. *Alayotityus pallidus* Teruel 2002. CUBA: *Santiago de Cuba*: Julio A. Mella: La Cantera, 11 March 1999, R. Teruel, 1 ♂ holotype, 2 ♂, 1 ♀, 1 juv. paratypes (RTO). 26 Sept 2003, R. Teruel, L. F. de Armas, 6 ♂, 3 ♀, 8 juv. topotypes (RTO).
9. *Alayotityus sierramaestrae* Armas 1973. CUBA: *Santiago de Cuba*: Guamá: Río La Mula, 15 June 2003, R. Teruel, Y. Pérez, 2 ♀ (CNAN). 12–21 June 2005, R. Teruel, K. Blanco, A. Pupo, 6 ♂, 8 ♀, 7 juv. (RTO)
10. *Centruroides gracilis* (Latreille 1804). CUBA: *Santiago de Cuba*: Santiago de Cuba city, 28 April 2000, R. Teruel, Y. Pérez, 3 ♂, 3 ♀ (CNAN).
11. *Centruroides exilicauda* (Wood 1863). MEXICO: *Baja California Sur*: Loreto, 13 km W to San Javier, provisional dirt road, 25° 58.817′N, 111° 27.211′W, 26 June 2008 (H. Montaño, E. González). 17 ♂, 14 ♀ (CNAN).
12. *Chaneke aliciae* (Armas & Martín-Frias 1998). [see material studied above]
13. *Chaneke fogoso* Francke, Teruel & Santibáñez-López 2014. [see original description above].
14. *Mesotityus vondangeli* González-Sponga 1981. VENEZUELA: *Aragua Estate*: Henry Pittier National Park: Río Catá (± 100 m a.s.l.), night search with UVL, upstream from the dam, 6 April 2006, F. J. M. Rojas-Runjaic, 2 ♂ (IES).
15. *Microtityus (Microtityus) rickyi* Kjellesvig-Waering 1966. [see Kjellesvig-Waering, 1996].
16. *Microtityus (Parvabsonus) jaumei* Armas 1974. CUBA: *Santiago de Cuba*: Playa Siboney, 18 May 2002, R. Teruel, M. Sobrino, 3 ♂, 3 ♀ (CNAN). CUBA: *Santiago de Cuba*: Playa Verraco, 4 May 2006, R. Teruel, F. Cala, 9 ♂, 6 ♀, 1 juv. (RTO).
17. *Rhopalurus junceus* (Herbst 1800). CUBA: *Camagüey*: Sibanicú, 20 Feb 1996, R. Teruel, 2 ♂, 2 ♀, 10 juv. (CNAN). Same data except 2 Jan 1997, R. Teruel, A. Basulto, 6 ♂, 7 ♀, 5 juv. (RTO).
18. *Tityopsis inaequalis* (Armas 1974). CUBA: *Pinar del Río*: San Cristóbal: Mameyal, 16 Feb 1981, L. F. de Armas, 1 ♂ (RTO). CUBA: *Pinar del Río*: Viñales: Hoyo de Fanía, 6 Dec 1984, L. V. Moreno, J. Novo, 1 ♀ (RTO).

19. *Tityopsis inexpectata* (Moreno 1940). CUBA: *Ciudad de La Habana*: Bosque de La Habana, 8–20 Jan 2005, R. Teruel, D. Ortiz, 1 ♂, 4 ♀, 2 juv. (RTO).
20. *Tityus bahiensis* (Perty 1833). BRASIL: *Sao Paulo*: Sao Paulo, no date (no colector). 1 ♂, 3 ♀ (CNAN).
21. *Tityus clathratus* C.L. Koch 1844. VENEZUELA: *Bolívar Estate*: Cedeño: Guaniamo (6°05′N–66°02′W, 150 m a.s.l.), no further data, 4 ♂, 1 ♀ (RTO: Sco–0508).
22. *Tityus columbianus* (Thorell 1876). COLOMBIA: *Boyacá Department*: Chiquinquirá (2,550 m a.s.l.), under rocks, in sandy soil, 3 March 2007, L. F. García, 10 ♂, 9 ♀, 1 juv. (RTO: Sco–0372).
23. *Zabius birabeni* Mello-Leitão 1938. [see Acosta et al. 2008].
24. *Zabius gaucho* Acosta, Candido, Buckup & Brescovit 2008 [see Acosta et al. 2008].
25. *Zabius fuscus* (Thorell 1876) ARGENTINA: *Córdoba*: La Cumbre, February 1997, L. Coronel, 1 ♂ (RTO: Sco–0192). [see also Acosta et al. 2008].

Appendix 2.—Distribution of 30 morphological characters (0–29) scored for a cladistic analysis of 25 species in 11 new world buthid scorpion genera with α trichobothrial pattern. Characters states are scored 0–5. ? (unknown). Refer to Appendix 1 for material examined and Appendix 3 for character descriptions.

| | | | |
|---|---|---|---|
| *Ananteris platnicki* | 0200100010 | 1010000040 | 0011111110 |
| *Mesotityus voudangeli* | 0101000010 | 0011011054 | 0001010010 |
| *Tityus bahiensis* | 0101000000 | 0000000024 | 1011011110 |
| *Tityus columbianus* | 0101000010 | 0011010024 | 0011011110 |
| *Tityus clathratus* | 0101000010 | 0011010054 | 0011011110 |
| *Centruroides exilicauda* | 0101000000 | 0000000011 | 1111011110 |
| *Centruroides gracilis* | 0101000000 | 0000000012 | 1111111110 |
| *Rhopalurus junceus* | 0301000000 | 0000000001 | 1111011110 |
| *Alayotityus delacruzi* | 0002011000 | 1122111132 | 0010020111 |
| *Alayotityus feti* | 0002011000 | 1122111132 | 0010020101 |
| *Alayotityus granma* | 0002011000 | 1122111132 | 0010020111 |
| *Alayotityus juraguaensis* | 0002011000 | 1122111132 | 0010020111 |
| *Alayotityus lapidicola* | 0002011000 | 1122111132 | 0010020101 |
| *Alayotityus nanus* | 0002011000 | 1122111132 | 0010020101 |
| *Alayotityus pallidus* | 0002011000 | 1122111132 | 0010020101 |
| *Alayotityus sierranaestrae* | 0002011000 | 1122111132 | 0010020111 |
| *Chaneke aliciae* | 1112101100 | 111111105 | 21010010011 |
| *Chaneke fogoso* | 1112101100 | 1111111052 | 1010010001 |
| *Microtityus (M.) rickyi* | 1102021001 | 0031011042 | 0001121111 |
| *Microtityus (P.) jamiei* | 1102011001 | 0011011042 | 0000121111 |
| *Tityopsis inaequalis* | 0102001010 | 0133011133 | 0011121111 |
| *Tityopsis inexpectata* | 0102001010 | 0133011133 | 0011121111 |
| *Zabius birabeni* | 0002011000 | 0111011134 | 1010121111 |
| *Zabius gaucho* | 0002011000 | ?1?1011134 | ?010121111 |
| *Zabius fuscus* | 0002011000 | 0111011134 | 1010121111 |

Appendix 3.—List of 30 morphological characters scored for 21 species of New World buthids with α triehobothrial pattern.

*Prosoma*

0. Carapace shape: trapezoidal (0), triangular (1).
1. Lateral ocelli: two pairs (0), three pairs (1), five pairs (2).
2. Lateral ocelli large, prominent, clearly visible in dorsal aspect (0), lateral ocelli small, dorsally covered by a crest, visible in frontal aspect (1).
3. Anterior margin: straight (0), V-notched (1), bilobed (2).
4. Carapace with distinct keels present (0), absent (1).

*Mesosoma*

5. Tergal carinae: one (0), three (1), five (2).
6. Distal granules on tergites: do not exceed posterior margin (0), do exceed posterior margin (1).
7. Males with genital papillae with a terminal fleshy, sharp, distinct point present (0), absent (1).
8. Females with basal intermediate lamella of pectines: normal (0), dilated (1).
9. Females with basal pectinal plate with posterior margin: normal (0), expanded (1).
10. Males with whitish patch on sternite III: absent (0), present (1).
11. Males with posteromedian area of sternite III: level (0), raised and granular (1).
12. Males with whitish patches on sternite V: absent (0), one posteromedian, usually oval or heart-shaped (1), two, transverse and oval (2), three, one posteromedian heart-shaped and two smaller laterally (3).
13. Females with whitish patch on sternite V: absent (0), one posteromedian, usually oval or heart-shaped (1), two, conical and widely separated (2), three, one posteromedian heart-shaped and two smaller laterally (3).
14. Females with whitish patch on sternite III: absent (0), present (1).
15. Lateral carinae on sternites IV–VI: absent (0), present [two or four] (1).
16. Respiratory stigmata: long and narrow (0), oval to round (1).

*Metasoma*

17. Lateral carinae on segment V: absent (0), present (1).
18. Subaculear tubercle: absent (0), smooth spine (1), spinoid with granules (2), conical (3), crest-like, (4), trapezoidal, with two granules (5).

*Pedipalps*

19. Number of denticle rows on pedipalp fingers: eight (0), nine or ten (1), eleven or twelve (2), thirteen or more (3).
20. Males with basal lobe on movable finger: absent (0), present (1).
21. Supernumerary denticles on fingers: absent (0), present (1).
22. Terminal macrochaeta on fingers: absent (0), present (1).
23. Femoral τ $d_2$: absent (0), present (1).
24. Femoral τ $i_3$: petite (0), normal (1).
25. Femoral τ $i_4$: absent (0), petite (1), normal (2).
26. Patella τ $d_2$ : absent (0), present (1).
27. Chela τ $Eb_3$ : absent (0), present (1).
28. Fixed finger τ esb: absent (0), present (1).
29. Throughout body, hollow macrochaetae with truncated apex: absent (0), present (1).